

Computer Science Ph.D. Qualifying Examinations

Rules and Reading List

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Rules

The Computer Science Ph.D. qualifying exams are given once a year, typically in January. Next time they will be offered in January 2007.¹ Students must notify the Director of Graduate Studies (dgs(at)cis.poly.edu) of their intent to take the exams at least one month in advance. There are three exams, which *must* be taken at the same time on the student's initial attempt. In general, students who do not pass all three exams will be required to retake all three. However, in exceptional circumstances, a student who does not pass all three exams may be required to retake only one of them. In either case, the exams must be retaken the next time they are offered. Students who do not pass the exams within two attempts may not continue in the PhD program.

Only students already accepted into the Ph.D. program may take the qualifying exams. Full-time students are expected to take the exams *no later than* during their second year. Supported full-time students may lose their support if they do not take the exams by that time. Full-time Ph.D. students who enter the program with a Master's degree are encouraged to take the exams during their first year if they feel they will have sufficient preparation (between their Master's coursework, their first-semester coursework at Poly, and their independent studying) by January of their first year.

Part-time students should consult the Director of Graduate Studies (dgs(at)cis.poly.edu) for an appropriate time to take these examinations. Normally, this will be after the student has taken the supporting courses (see below) for the examinations.

The contents of the reading list for each exam define the required knowledge on which the respective exam is based. While the student is advised to take the supporting courses associated with each exam, the student should rely on the reading lists, *not* the actual contents of the supporting courses, for a definition of expected knowledge. (This is for the sake of uniformity, as students may take the supporting courses at different campuses, with different instructors and/or different texts.)

Samples of exams given in previous years are available from the department.

¹We plan to revise the form and/or content of the qualifying exams offered after January 2007. Details coming up.

Algorithms and Theory of Computation (3 hours)

Supporting Courses:

CS603 Algorithms I, CS604 Algorithms II, CS675 Theory of Computation.

Algorithms

Reading List: Cormen, Leiserson, Rivest, and Stein, *Introduction to Algorithms*, Second Edition, McGraw-Hill/MIT Press, 2001, Topics I–VI (pp. 1–698) and Chapter 34 from Topic VII (pp. 966–1021).

Faculty Contact: Prof. Y.-J. Chiang, LC230, e-mail: yjc(at)poly.edu, tel.: 718-260-3395.

Theory

Reading List: J.C. Martin, *Introduction to Languages and the Theory of Computation* (second edition). Chapters 1–5, 6.1–6.4, 6.6, 8–10, 12.1–12.4, and 14–15.

OR

M. Sipser, *Introduction to the Theory of Computation*, Second Edition, Chapters 0, 1, 2 (only sections 1 and 3), 3, 4, 5 (only sections 1 and 3), 7.

Please be advised that the reading list for this exam is likely to change after the 2007 exams, in the following manner: Martin's book will be removed.

Faculty Contact: Prof. L. Hellerstein, LC234, e-mail: hstein(at)poly.edu, tel.: 718-260-3689.

Architecture and Operating Systems (3 hours)

The exam consists of basic material from both topics plus a *choice* of advanced material from either architecture or operating systems.

Supporting Courses:

CS613 Computer Architecture I, CS614 Computer Architecture II, CS623 Operating Systems I, CS624 Operating Systems II.

Basic Reading List for Operating Systems

(Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, *Operating System Concepts*, Seventh Edition, John Wiley & Sons, Inc. ISBN 0-471-69466-5, 2005; chapters 1–12. (Alternatively, in January 2007 exam you may use the previous edition: Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, *Operating System Concepts*, Sixth Edition, John Wiley & Sons, Inc, 2001. ISBN 0-471-41743-2; chapters 1–12.)

OR

William Stallings, *Operating Systems: Internals and Design Principles*, 5th Edition, Prentice Hall, 2004; chapters 1–9, 11–12. ISBN 0-131-27837-1. (Alternatively, in January 2007 exam you may use the previous edition: William Stallings, *Operating Systems*, 4th Edition, Prentice Hall, Upper Saddle River, NJ 2001; chapters 1–9, 12.)

AND

Mendel Rosenblum and John K. Ousterhout, The Design and Implementation of a Log-Structured File System, *Proceedings 13th Symposium Operating Systems Principles*, October 1991.

M.K. McKusick, W.N. Joy, S.J. Leffler and R.S. Fabry, A Fast File System for UNIX, *ACM Transactions on Computer Systems*, vol. 2, no. 3, pp. 181-197, August 1984.

P.M. Chen, E. Lee, G.A. Gibson, R.H. Katz, and D. Patterson, RAID: High-Performance, Reliable Secondary Storage, *ACM Computing Surveys*, vol. 26, no. 2, pp. 145-185, 1994.

Carl A. Waldspurger and William E. Weihl, Lottery Scheduling: Flexible Proportional-Share Resource Management, *Proceedings of the First Symposium on Operating Systems Design and Implementation (OSDI '94)*, pages 1-11, Monterey, California, November 1994.

Note that the reading list includes the technical papers listed above, available at <http://ebets.poly.edu/wein/os-papers.html>.

Advanced Material for Operating Systems

(Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, *Operating System Concepts*, Seventh Edition, John Wiley & Sons, Inc. ISBN 0-471-69466-5, 2005; chapters 1–13, 16–18. (Alternatively, in January 2007 exam you may use the previous edition: Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, *Operating System Concepts*, Sixth Edition, John Wiley & Sons, Inc, 2001. ISBN 0-471-41743-2; chapters 1–14, 18–19.)

OR

William Stallings, *Operating Systems: Internals and Design Principles*, 5th Edition, Prentice Hall, 2004; chapters 1–14. ISBN 0-131-27837-1. (Alternatively, in January 2007 exam you may use the previous edition: William Stallings, *Operating Systems*, 4th Edition, Prentice Hall, Upper Saddle River, NJ 2001; chapters 1–12, 15.)

AND

George Coulouris, Jean Dollimore, and Tim Kindberg, *Distributed Systems: Concepts and Design*, 4rd edition, Addison-Wesley, 2001. ISBN 0321263545. (Alternatively, for January 2007 exam you may use the previous edition: George Coulouris, Jean Dollimore, and Tim Kindberg, *Distributed Systems: Concepts and Design*, 3rd edition, Addison-Wesley, 2001.)

Faculty Contact: Prof. J. Wein, LC232, e-mail: wein(at)mem.poly.edu, tel.: 718-260-3376.

Basic Reading List for Architecture

J. L. Hennessy and D. A. Patterson, *Computer Architecture: A Quantitative Approach*, 3rd edition, Morgan Kaufman Publishers Inc., 2003, Chapters 1, 2, 5, Appendices A and H.

Advanced Material for Architecture

J. L. Hennessy and D. A. Patterson, *Computer Architecture: A Quantitative Approach*, Third edition, Morgan Kaufman Publishers Inc., 2003, Chapters 3, 4, 6, 7, 8, Appendices G and I.

AND

K. Hwang, *Advanced Computer Architecture : Parallelism, Scalability, Programmability*, McGraw-Hill, 1993, Chapter 2, Section 3.3, and Chapters 5–9.

Faculty Contact: Prof. H. Hadimioglu, LC114, e-mail: haldun(at)photon.poly.edu, tel.: 718-260-3101.

Programming Languages, Compilers, Artificial Intelligence, Software Engineering, and Databases (3 hours)

The exam consists of five parts. *All* students must answer the Programming Languages part and choose *two* of the remaining four parts.

Supporting Courses:

CS637 Programming Languages, CS641 Compilers I, CS661 Artificial Intelligence I, CS606 Software Engineering I, and CS 608 Principles of Database Systems.

Programming Languages

Reading List: Sebesta, *Concepts of Programming Languages*, 7th Ed., Addison-Wesley, 2006.

Faculty Contact: Prof. P. Frankl, LC237, e-mail: pfrankl(at)poly.edu, tel.: 718-260-3870.

Compilers

Reading List: Aho, Sethi and Ullman, *Compilers: Principles, Techniques, and Tools*, Addison-Wesley, 1986, Chapters 1–5.5 and 8–10.7.

Faculty Contact: Prof. B. Aronov, LC236, e-mail: aronov(at)poly.edu, tel.: 718-260-3092.

Artificial Intelligence

Reading List: S. Russell and P. Norvig, *Artificial Intelligence: A Modern Approach*, 2nd Edition, Prentice Hall, 1995. Chapters: 1–9.

Faculty Contact: Prof. E. Wong, LC217, e-mail: wong(at)poly.edu, tel.: 718-260-3523.

Software Engineering

Reading List: Roger S. Pressman, *Software Engineering: A Practitioner's Approach*, Sixth edition, McGraw Hill, 2005. Chapters 1–9, 14, 15, 21–27. ISBN 0072853182.

Faculty Contact: Prof. S. Steele, LC240, e-mail: ssteele(at)rama.poly.edu, tel.: 718-260-3357.

Databases

Reading List: *Database Systems Concepts*, by A. Silberschatz, H. Korth, and S. Sudarshan, Fourth Edition, McGraw Hill, 2002. Chapters 1–4, 6–7, 11–16, 17.1–17.4.

OR

Database Systems Concepts, by A. Silberschatz, H. Korth, and S. Sudarshan, Fifth Edition, McGraw Hill, 2005. Chapters 1–4, 5.1–5.2, 6–8, 11–16, and 17.1–17.4.

Faculty Contact: Prof. T. Suel, LC245, e-mail: suel(at)poly.edu, tel.: 718-260-3354.